[0096] When the composition ratio of the principal components of the body is changed due to increase and decrease of the user's body weight, changes in diet and lifestyle, and the like, the storage 250 may track and record the changing process, and store the latest Raman spectrum analysis result as the user characteristic information.

[0097] The authenticator 240 may authenticate a user based on the analysis result. At this point, the authenticator 240 may authenticate the user's identity by comparing the analysis result of the Raman spectrum analyzer 230 and user characteristic information stored in advance.

[0098] When the user's identity is authenticated by the authenticator 240, the information provider 260 may process the analysis result of the Raman spectrum with respect to the authenticated user and provide information about the health status of the user. The information about the health status may be information that is described in association of the principal component composition ratio analyzed from the Raman spectrum and the feature information about the principal composition with the health status of the user.

[0099] The user authentication apparatus 200 using the Raman spectrum may perform a user authentication based on biometric information of the user in a non-invasive manner. In addition, the user authentication apparatus 200 using the Raman spectrum may perform the user authentication and provide the information about the health status of the user at the same time, and thereby may contribute to user convenience.

[0100] The functions of the apparatus and method disclosed in this application may be realized as computer-readable codes in computer-readable recording media. The computer-readable recording media include all kinds of recording devices in which data that is readable by a computer system is stored.

[0101] The computer-readable recording media include all kinds of recording devices in which data that are readable by a computer system are being stored. Examples of the computer-readable recording media include a read-only memory (ROM), a random access memory (RAM), a compact-disc ROM (CD-ROM), a magnetic tape, a floppy disk, an optical data storage device, etc., and may be also realized in the form of a carrier wave (for example, transmission through the Internet). In addition, the computer-readable recording media may be distributed into the computer system that is connected through the networks to store and implement the computer-readable codes in a distribution mechanism. Furthermore, functional programs, codes and code segments, all of which are used to practice exemplary embodiments, may be easily deduced by programmers in the art to which the exemplary embodiments belong.

[0102] A number of examples have been described above. Nevertheless, it may be understood that various modifications may be made. For example, suitable results may be achieved if the described techniques are performed in a different order and/or if components in a described system, architecture, device, or circuit are combined in a different manner and/or replaced or supplemented by other components or their equivalents. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A user authentication apparatus using a Raman spectrum, the user authentication apparatus comprising:

a Raman spectrum analyzer configured to analyze user characteristic information from a Raman spectrum of a user; and

an authenticator configured to authenticate the user, based on the analysis.

2. The user authentication apparatus of claim 1, wherein the Raman spectrum analyzer is further configured to:

extract, from the Raman spectrum, data comprising any one or any combination of a type of the Raman spectrum, a Raman shift of a peak point, and an intensity of the peak point; and

analyze the extracted data as the user characteristic information.

3. The user authentication apparatus of claim 1, further comprising:

a light source configured to irradiate skin of the user with light; and

a Raman spectrum acquirer configured to:

receive light that is reflected from the skin; and

acquire the Raman spectrum from the received light.

4. The user authentication apparatus of claim 3, wherein the light source is further configured to irradiate the skin of the user with light for a predetermined time, and

the Raman spectrum analyzer is further configured to, in response to fluorescence bleaching occurring in the Raman spectrum over time, extract a fluorescence bleaching range from the Raman spectrum, and analyze the extracted fluorescence bleaching range as the user characteristic information.

5. The user authentication apparatus of claim 4, wherein the Raman spectrum analyzer is further configured to:

extract, from the extracted fluorescence bleaching range, data comprising either one or both of a principal component composition ratio of the skin of the user and feature information of a first principal component; and

analyze the extracted data as the user characteristic information.

6. The user authentication apparatus of claim 5, wherein the Raman spectrum analyzer is further configured to extract, from the extracted fluorescence bleaching range, the principal component composition ratio of the skin of the user, using a principal component analysis method.

7. The user authentication apparatus of claim 5, wherein the feature information of the first principal component occupies a largest proportion of the principal component composition ratio.

8. The user authentication apparatus of claim 5, wherein the Raman spectrum analyzer is further configured to:

repeatedly measure the feature information of the first principal component at an arbitrary time; and

verify reproducibility of the measured feature information of the first principal component.

9. The user authentication apparatus of claim 1, further comprising:

a storage configured to store the analysis as the user characteristic information,

wherein the authenticator is further configured to authenticate an identify of the user by comparing the analysis and pre-stored user characteristic information.

10. The user authentication apparatus of claim 1, further comprising:

an information provider configured to:

process the analysis with respect to the authenticated user; and